Discrete Mathematics
Math 2513, Spring 2005

Some Guidlines for Constructing and Writing Proofs

- A proof really just consists of a sequence of sentences each of which follows from the preceding sentences by common-sense logic using hypotheses, definitions or previously proven theorems.

- Before starting to organize the ideas for your proof make sure that you clearly understand the hypothesis (or hypotheses) and the conclusion of the statement to be proven.

- Determine all of the key definitions that play a role in the statement to be proven, and make sure you are familiar with these definitions before starting to construct your proof. Just thinking about the key definitions should start to give you ideas about how to construct your proof.

- Do scratch work on the side to think out the line of explanation that you will use. Do this before starting to write the final proof. Your scratch work may incorporate Venn diagrams or other schematic diagrams, whatever helps you to organize the ideas.

- In organizing your proof it's almost good to start by examining the desired conclusion and thinking about what will need to be done to verify it. In other words in your scratch work start at the end and work backwards.

- Are there any previously proven theorems that you might use to shorten your proof?

- In your final proof, always write in complete sentences. Remember, a sentence starts with a capital letter and ends with a period. It has a verb, a subject and a predicate.

- Try to avoid overuse of mathematical or logical symbols in your final proof. Be particularly cautious about allowing a sentence's verb to be encoded in a symbol.

- Use the first sentence or two of your proof to declare any variables that you will use. If there is some object that you will refer to frequently throughout the proof then you might consider introducing a variable for that object so that you can refer to it easily during the proof. After declaring variables, use the next sentence or two to write out the hypotheses of the statement you are proving.

- It is often nice to devote the last sentence of your proof to summarizing or partly recapping your line of argument. And then end with '□' or 'QED'.

- When you have completed the proof it is a good idea to look back and check where all of the key definitions were used. Also check to see if all of the hypotheses were used.